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CSI-043 THE CO-MOVEMENT BETWEEN OIL AND AGRICULTURAL COMMODITY PRICES: EVIDENCE FROM AN EMERGING MARKET IN CHINA

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The co-movement between oil and agricultural commodity prices: Evidence from an emerging market in China

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Abstract

Simultaneous rapid rise in both the world oil and agricultural commodity prices have increased interest in determining price transmission from oil prices to those of agricultural commodities. However, although a lot of the empirical research has studied the relation between oil price changes and economic activity, it is surprising that little research has been conducted on the relationship between oil price shocks and the large-size emerging industrial countries agricultural market. Therefore, the main goal of this study is that we are try to use the more detail and new China's weekly data which from 2004/9 to 2012/9 to fill this gap. This study examines the short and long-run interdependence between China fuel oil prices and the average of different kinds of key agricultural commodity prices in China. To this end, the Toda–Yamamoto causality approach and impulse response analysis method are applied to identification of the long and short-run interrelationships. In contrast to lots of the traditional causality analysis indicates that the oil prices and the agricultural commodity prices do not influence each other, our result is mix: we have inferred that the fluctuation of fuel oil price has a short-run effect on the dynamics of agricultural products in China; however, there are no significant in the long-run effects.

JEL classifications: C22, C32, F32, F36, G15
Key words: Oil price; Agricultural commodity prices; NIEs; China
Granger causality

1. Introduction

World agricultural commodity prices rose sharply from 2006 to mid-2008, the record high prices of major agricultural products such as corn, soybeans and wheat appeared in mid-2008, while oil prices also reached the highest level.[1] Therefore, the recent surge in prices of agricultural products caused a rush wave to study what the major factor to promote agricultural prices rise. Although there are many other factors or affect each other, the high price of oil is still considered to be the main reason to drive up the prices of agricultural products (see Abbott et. al. (2008), Mitchell (2008), OECD (2008) and FAQ (2008) instructions). In fact, agricultural products and oil prices were matched highly dynamic consistent recently.

Generally, there are three important factors to drive agricultural price rise on traditional literature: excess demand, the value of the dollar and energy - agriculture

[1] See Nazlioglu (2011, Fig. 1).

linked. However, energy prices were considered to be best able to explain the key to rise world agricultural prices recently (see Cooke and Robles (2009)). Firstly, energy and agricultural products market has been closely linked since agricultural products turn as biofuels increasing abruptly after 2006. In fact, due to the ethanol and biodiesel can be used as substitute of gasoline and diesel, the main cause of the recent agricultural price rocketed and crops turn related as biofuels huge increase. In addition, agriculture has always been energy-intensive industries in the history, so we can get a direct link to oil prices on agricultural price; such as Hanson et al. (1993) explain that rise oil prices make the input costs increasing and then cause the agricultural price up. Finally, the another channel of oil price to affect agricultural price is through the exchange rate, such as Harri et al. (2009) discuss the price of oil through the exchange rate to have an indirect effect on the prices of agricultural products. In fact, oil price changes have a direct impact on all countries' currency since the main crude oils were traded through U.S. dollars. Meanwhile, the appreciation (depreciation) of one country's currency would have feedback impact to import and export of agricultural commodities and their prices. Consequently, oil price has two channel to affect agricultural price: one is the direct impact of oil prices on agricultural price, another is indirect impact through the exchange rate.

However, the study about the interaction between oil prices and agricultural prices in the relevant empirical literature is still not clear and not very in-depth discussion for emerging markets or developing countries agricultural price (see Nazlioglu (2011)). Among the large-size newly industrialized economies (NIEs), one major development in both oil and agricultural commodity markets since the late 1990s is the emergence of China. Indeed, as mentioned in Bénassy-Quéré et al. (2007), China accounted for one-fourth of the world’s incremental oil demand over 1995-2004 and one-third in 2004. Looking forward, China is expected to account for 12% of global oil demand in 2025 (instead of the 7% in 2005), whereas Western Europe is expected to fall back from 19% in 2005 to 15% in 2025. The prices of agricultural products is very important on China's economy since the agricultural sector in 2010 generated 10.1% of the total GDP (China Statistics Bureau database, 2011), and the central bank adopted a managed floating exchange rate system. In addition, as China has the largest official reserves of foreign currencies and the world’s fourth largest economy as of 2007, its economy recorded 11.7% annual average real growth from 2002-2008. However, in contrast to a huge body of literature evaluating the relationship between oil price shocks and macroeconomic variables, little empirical work has been conducted explicitly so far to disentangle the role of oil price shocks from other underlying determinants driving agricultural commodity prices in China. Therefore, the main goal of this paper is to use the new and more detailed weekly data set from 2004/9 to 2012/9 to fill this gap. We want to analyze the correlation between oil prices and agricultural prices, which will help us gain insight into the sources of past agricultural prices movements in China.

The remainder of this paper is arranged as follows. Section 2 provides a brief review of existing work and outlines our contribution to the literature. Section 3 describes the data and empirical methodology applied in this study. Section 4 reports the estimation results. Final conclusion remark is described in Section 5.

2. Literature review

The price of agricultural products rose sharply since the beginning of the twenty-first century, this cause a swarm to study the causal relationship between energy prices and agricultural commodity prices recently. Among them, many scholars have found the neutrality assumptions: there is no relationship between agricultural prices and oil prices. Such as Yu et al. (2006) using weekly trade data from January 1999 to March 2006, to observe the dynamic relationship between the four major traded edible oil price and the world price of crude oil, and found that the oil price shock would not have a significant impact on edible oil prices. Kaltalioglu and Soytas (2009) investigate the link between world foods and crude oil through the impulse response functions from January 1980 to April 2008, and concluded that changes in oil prices do not have a significant impact on world food prices. Secondly, Zhang and Reed (2008) using data from January 2000 to October 2007, to test the impact of oil price shocks on China's corn, soybean meal and pork prices. Through VARMA model, Granger causality test and impulse response function application, the authors believe that the recent surge in world oil price shocks do not affect the prices of main agricultural products in Chin. In addition, Mutuc et al. (2010) observed the impact of oil price fluctuations on U.S. cotton prices by structural vector error correction model. They found that only 3% of the explanatory power of changes in oil prices on long-term cotton prices, then the U.S. cotton price rise cannot be attributed oil price shocks. Finally, Zhang et al (2010) study the relationship between several fuel prices (ethanol, gasoline and oil) and the prices of agricultural products (corn, rice, soybeans, sugar and wheat) by co-integration analysis, and found that long-term agricultural prices are neutrality to the price of fuel. On the other hand, the study also found that oil prices - the prices of agricultural products with a one-way causal relationship. In addition, Campiche et al (2007) using the Johansen co-integration test to study the relationship between the world's crude oil and six agricultural prices in 2003-2007. Although there is no co-integration relationship between the 2003-2005, they find that corn and soybean prices are co-integrated with crude oil prices during the 2006-2007. Zhang (2010) show that the price of sugar have a positive impact on oil prices from recent studies. Others, Hameed and Arshad (2008), Cooke and Roble (2009) have the similar result. To sum up, the relationship between the prices of oil and agricultural products is still not clear through a literature review presentation, we need to deal with this problem through a variety of methods to further.

In addition, agricultural products and oil are usually denominated in U.S. Dollar, thus the weak dollar makes goods cheaper and promoting the increase in demand and prices of agricultural products during 2002-2008 (such as, McCalla (2009), Baek and Koo (2010) and Harri et al. (2009)). Therefore, in the analysis of the impact of rising oil prices on the prices of agricultural products, it may be omitted variables and generate an error if we neglect the exchange rate (ie, the value of the dollar). From this perspective, the recent studies that joined the considerations of the dollar. For example, Harri et al (2009) using co-integration and vector error correction model to study of the relationship between the exchange rate and the price of oil, corn, cotton, soybeans, wheat prices in the period from January 2000 to September 2008, authors found that selected agricultural prices (except wheat) have a total integration with the price of oil, and the exchange rate plays an important role. In the same spirit, Kwon and Koo (2009) use Granger causality test of Toda and Yamamoto (1995) to study long-term causal relationship between energy prices, exchange rates and food prices from January 1998 to July 2008. They showed that the exchange rate and energy prices could affect food prices through a variety of channels. Recently, Baek and Koo (2010) for the period from January 1989 to

January 2008 found that the exchange rate is one of the key factors to determinate U.S. food prices in the short-term and long-term operation, but the influence of oil prices in the short-term is more important than long-term.

Additionally, with a population exceeding 1.3 billion and an average economic growth of 9.5 per cent from 2003 to 2007, China's energy demand has increased spectacularly as a result of rapid expansion of the industrial and commercial sectors, as well as that of households. However, there are not many studies explaining the relationship among oil price shocks and China's exchange rate and economic activities. Such as Huang and Guo (2007)'s investigation into the extent to which oil price shock and three other types of underlying macroeconomic shocks impact the movements of China's real exchange rate. By constructing a four-dimensional structural VAR model, their results suggested that real oil price shocks would lead to a minor appreciation of the long-term real exchange rate due to China's rigorous government energy regulations and its lower dependence on imported oil than its trading partners included in the Renminbi (hereafter RMB) basket peg regime. Bénassy-Quéré et al. (2007) studied cointegration and causality between the real price of oil and the real price of the Dollar over the period between 1974 and 2004. Their results suggested that a 10% increase in the oil price coincides with a 4.3% appreciation of the Dollar in the long run, and that the causality runs from oil to the Dollar. By the development of a theoretical model, they then investigate possible reasons why this relationship could be reversed in the future due to the emergence of China as a major player in both the oil and the foreign exchange markets. In addition, Zaouali (2007) conducted a quantitative analysis on the potential impact of the rise in oil prices on the Chinese economy. Its GDP has dropped by 0.5 to 0.9 percent due to the impact of higher oil price, which is nonetheless relatively modest. But the strong investment and the large flow of foreign capital in China were sufficient to counterbalance the negative impact of higher oil prices. However, in contrast to a huge literature on valuation of the relationship between oil price shocks and macroeconomic variables, no empirical work has yet been conducted explicitly so far to disentangle the role of oil price shocks from other underlying determinants driving agricultural commodity market returns in China. Therefore, the main goal of this paper is to analyze the correlation between oil prices and agricultural prices, which will help us gain insight into the sources of past agricultural prices movements in

China.

3. The data and empirical methodology

3.1 Data

The Chinese economic reform since 1978 has created the record-breaking prolonged fast growth of GDP per capita. Accompanying the economic reform was the remarkable liberalization of agricultural pricing and marketing. The Chinese government primarily aimed at replacing mandatory procurement with voluntary contracts between farmers and the government. Following this trend, the grain rationing system was abolished, leading to the free market-determined prices of all agricultural products. The Developing nation as China then contributes disproportionately to the global trade and consumption of agricultural products. With the goal of understanding the relationship between the price of fuel and agricultural products, the case of China would remarkably unveil the price mechanism functioned in the mainstream developing economies.

We then describe our data and some stylized facts about the evolution of price in the agricultural products and fuel oil in China. We use the weekly price survey of agricultural products. The weekly surveyed data of agricultural products are collected and revealed by the Ministry of Commerce in China, which we downloaded from CEIC Data Manager and then complemented the incomplete data from the informal source of personal link with the insiders.[2] The weekly surveyed data of domestic fuel oil price in China are hand-collected from the database of the Shanghai Futures Exchange (SHFE). We use the daily exchange data of the fuel oil price expired in one month and take a weighted moving average of the following five working days in a week. Thus the time span of the domestic fuel oil price can fully align with the collected weekly survey data of the agricultural products. We utilize the weekly data over the period from September 2004 to September 2012 for 416 observations of each series in concern. The data includes 11 time seies for China fuel oil price (oil), and price of rice (rice), flour (flr), soybean oil (syn), peanut oil (pnt), grape seed oil (gsd), salad oil (sld), egg (egg), white granulated sugar (sug), salt (salt), and white chicken meat (wchi). The period is selected based on the data availability in the CEIC China Premium

[2] The CEIC China Premium Database is an economic time-series database, focused exclusively on the Chinese market that contains historical data dating back to 1949. The database is systematically organized into macroeconomic, sector and regional databases with 293,000 time-series available for analysis

Database. The agricultural products studied here entail the necessities of daily consumption by the general public in China as well as the boifuel production.[3] The price data of each time series in discussion are all denominated in RMB. The variables here are transformed to the natural logarithm values.

As observed from Figure1, the fuel oil price increases drastically around the period of financial crisis in the year 2008, which in turn leads to lower oil prices through the weakening demand. The behavior of the fuel oil price in China seems to be highly consistent with the global business cycle within the observation period here.

In addition, agricultural product prices in general increase at a pace much smoother than the movement of fuel oil price. To illustrate, the observation period shows a much stable increase between 2004 and 2006 and also rise sharply from 2007 to 2008. As show in Figure 2, rice and flour do not show signs of drastic price movement in the observation period while other agricultural products reached their peak levels in 2008 and then went downturn during the period of financial crises in the year 2008. However, the prices are still higher than their historical levels of the prices before year 2006.

The descriptive statistics of the series in discussion are summarized in Table 1. The price of fuel oil and sugar are the most volatile as suggested by the coefficient of variations (C.V.) exported in Table 1. The result is in line with our basic understanding about the fuel oil trading markets. This can be partly attributed to the frequently trading behavior of global futures market in the crude oil or fuel oil areas. The price of sugar here also aligns with the dynamics of fuel price. Our guess is that the input of the sugar can be used to make the biofuel and the price of fuel oil is thus propelled by the volatile fuel oil price. On the other hand, the price of other agricultural products has relative small volatility which exhibit similar pattern of price movement across the observatory periods. In order to clarify the existence and direction of causality we should utilize the advance econometric skills in the analysis of the correlation.

[3] The production of soybean oil, peanut oil, grape seed oil, salad oil and white granulated sugar entails the common inputs used in production of several biofuels.

Figure 1: The dynamics of fuel oil price in China

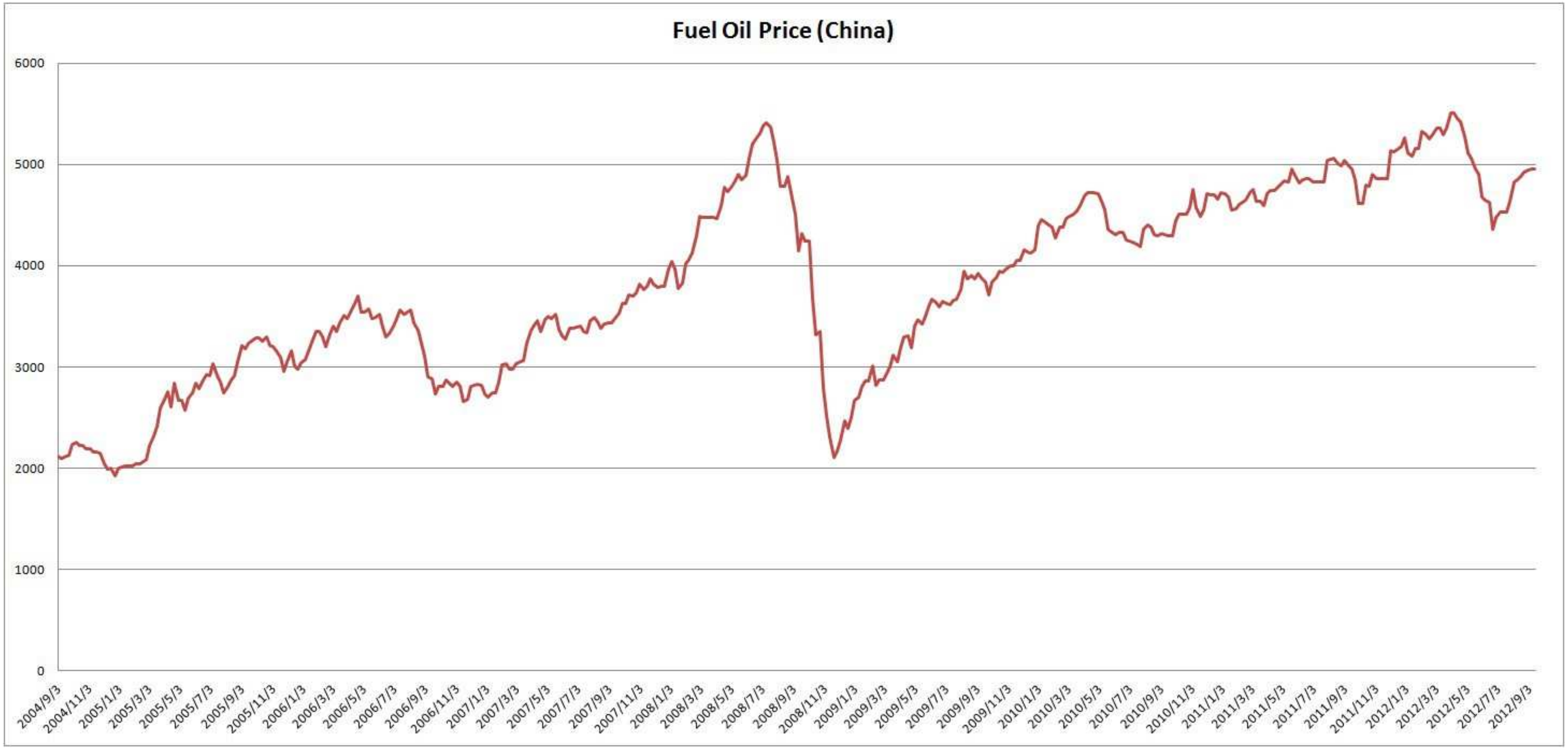


Figure 2: The movement of agricultural product price in China

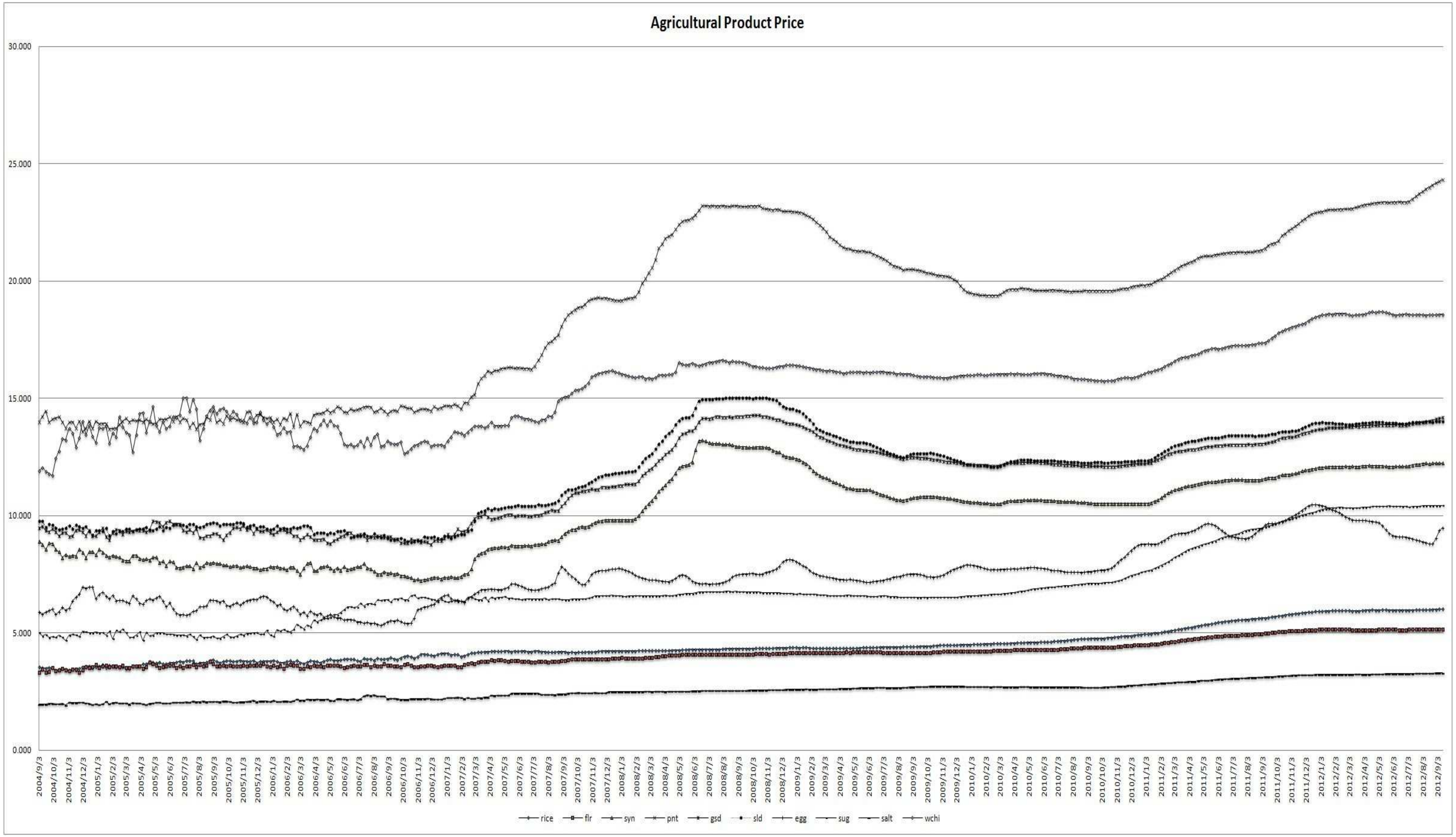


Table 1: Descriptive statistics

	oil	rice	flr	syn	pnt	gsd	sld	egg	sug	salt	wchi
Mean	3813.1	4.5	4.2	10.1	18.9	11.6	11.9	7.5	7.0	2.6	15.6
std. dev	924.6	0.8	0.6	1.8	3.6	1.9	2.0	1.3	1.7	0.4	1.8
C.V.	0.24	0.17	0.13	0.18	0.19	0.16	0.16	0.17	0.24	0.16	0.11
Skewness	-0.14	0.80	0.61	-0.15	-0.19	-0.18	-0.15	0.43	0.84	0.29	0.04
Kurtosis	-1.0	-0.5	-0.8	-1.4	-1.4	-1.5	-1.4	-0.7	-0.2	-0.9	-0.8
Obs	416	416	416	416	416	416	416	416	416	416	416

Note: C.V. indicates the Coefficient of variation that is the ratio of standard deviation to mean.

3.2 Methodology

In order to clarify the relations between the associated series, the Vector Autoregressive Model (VAR) is adopted here. The reason for this approach is that VAR effectively ana- lyze the dynamic interactions as well as the feedback effects between the time series in discussion. However, a major concern here is that the estimated bias in the estimation of cointegrating equation may be carried over to the following phase of the analyses. Zapata and Rambaldi (1997) have elaborated on this issue of estimated bias and stress that the problem is worsened as there are increasing cointegrating relationship embed- ding in the associated time series. Therefore, the Toda and Yamamoto (1995) has its unique remedy to overcome the traditional problem. Instead of the traditional pre-test for cointegration , Toda and Yamamoto run a pairwise Wald test that does not incur an estimation of cointegrating vector. In addition, Toda and Yamamoto procedure works in the time series with any integration orders as well.

A pre-required step to adopt the VAR model here is to check the unit root property associated with the time series in concern. Since most time series variables have a unit root, we cannot use those data without considering their unit root property. Otherwise, a spurious regression problem may occur and the results may not be reliable. To avoid this problem, we have to check whether the variables applied in this study have a unit root or not. Therefore, we use the ADF test first to check the unit root property as follows. The ADF test is called the augmented Dicker-Fuller test. By considering the variables to be an autoregressive process with order p (AR(p)) process in Said and Dickey (1984), the ADF test can be applied to check whether the high order autoregressive variables have the unit root process. Let us illustrate the ADF test as follows:

$$y_t = \varsigma_1 \Delta y_{t-1} + \varsigma_2 \Delta y_{t-2} + \cdots + \varsigma_p \Delta y_{t-p} + \alpha + \delta t + \rho y_{t-1} + \eta_t , \eta_t \sim N(0, \sigma_\eta^2) \quad (1)$$

where y_t is the stock return at the period t, $\Delta y_{t-1}, \ldots, \Delta y_{t-p}$ are the first difference of the stock return, t is the trend of the stock return, y_{t-1} is the lagged term of the stock return, and η_t is an identical independent distribution (*i.i.d.*) white noise process. From Equation (1), $|\rho|=1$ means that the data in question have the unit root property and the data are non-stationary. On the other hand, $|\rho|<1$ means that the data have no unit root, thus they are stationary.[4]

The Toda and Yamamoto procedure then continues by conducting a modified Wald test on the first k parameters of a lag augmented LA-VAR (k+d) system as follows:

Consider a VAR(p) process as follows,

$$y_t = \alpha + \beta_t y_{t-1} + \ldots + \beta_{k+d} y_{t-(k+d)} + \varepsilon_t \quad (2)$$

where $y_t = (oil, rice, flr, syn, pnt, gsd, sld, egg, sug, salt, wchi)$, α is a 11×1 vector of constants, β_i are 11×11 coefficient matrices and ε_t are white noise residuals.[5]

The Toda and Yamamoto (1995) utilizes the Wald test statistic on the significance of the first k parameters in equation 2. The Wald statistic here follows χ^2 distribution with k degrees of freedom asymptotically. Thus the null hypothesis of "no Granger causality" can be deduced if the test statistic does not attain the significance level. The long-run causal relationship between the series in concern can be inferred following the result of the Toda and Yamamoto procedure.

The Toda and Yamamoto procedure remedies the long run Granger causality tests and suggests the long run causal relationship between the series in concern. However, this reliable procedure does not enlighten us on the effect brought about by a short run shock in one of the variables in concern. We then introduce the IRA to analyze how different shocks affect the China agricultural product market.

4. Empirical findings

4.1 Basic statistics description and stationary test

A crucial step associated the Toda and Yamamoto procedure is to determine the optimum lag length as well as the maximum order of integration of the series in concern. The optimum lag length is determined via four different selection-order criteria and the maximum order of integration of the series can be judged from the Dickey and Fuller (1979) (ADF). The results from the ADF test in table two indicates that the maximum order of integration is one that is $d = 1$ here. Table three reports the result of the four different selection-order criteria for the final prediction error (FPE), Akaike's information criterion

4 If neither mean nor autocovariance depend on the date t, the process y_t is called a (weakly) stationary process.

5 k is the optimum lag length determined by the criteria of *FPE,AIC,HQIC,SBIC*.

(AIC), Hannan and Quinn information criterion (HQIC), and Schwarz's Bayesian Information Criterion (SBIC). According to these models, FPE and AIC prescribes longer lags than the data can accommodate; however, SBIC indicates a much shorter one period lag which contradicts with the weekly data frequency used here. Therefore, we adopt the three period lag "k" as 3 suggested by HQIC. The Toda and Yamamota procedure then proceed with the lag length "$k + d = 4$" and this procedure can avoid any pre-test biases being brought about to Granger causality results by skip- ping over a pre-test for integration.

Table 2: Results for unit root tests.

Number of obs = 416			
		ADF	optimal lag
Levels			
Intercept	lnoil	-2.28	3
	lnrice	0.99	4
	lnflr	0.13	3
	lnsyn	-0.39	2
	lnpnt	-0.71	4
	lngsd	-0.30	1
	lnsld	-0.85	4
	lnegg	-1.03	4
	lnsug	0.99	3
	lnsalt	-0.25	3
	lnwchi	-0.18	3
Intercept and trend	lnoil	-3.28^{*}	3
	lnrice	0.81	4
	lnflr	-1.66	3
	lnsyn	-1.24	2
	lnpnt	-1.28	4
	lngsd	-1.19	1
	lnsld	-1.31	4
	lnegg	-3.10	4
	lnsug	-0.52	3
	lnsalt	-3.08	3
	lnwchi	-2.8	3

First-difference			
Intercept	lnoil	−8.80*	3
	lnrice	−12.06*	3
	lnflr	−12.86*	3
	lnsyn	−13.21*	1
	lnpnt	−6.84*	3
	lngsd	−6.78*	4
	lnsld	−7.19*	3
	lnegg	−8.13*	3
	lnsug	−14.74*	2
	lnsalt	−12.15*	2
	lnwchi	−13.46*	2
Intercept and trend	lnoil	−8.80*	2
	lnrice	−12.14*	3
	lnflr	−12.89*	4
	lnsyn	−13.20*	1
	lnpnt	−6.83*	3
	lngsd	−6.78*	4
	lnsld	−7.18*	3
	lnegg	−8.11*	3
	lnsug	−14.80*	2
	lnsalt	−12.15*	2
	lnwchi	−13.46*	2

Note: ln denotes natural logarithm.

Table 3: Selection-order criteria

Number of obs = 416				
Lag	FPE	AIC	HQIC	SBIC
0	1.0e-31	-40.16	-40.12	-40.05
1	1.5e-44	-69.69	-69.19	−68.42*
2	6.2e-45	-70.58	-69.61	-68.13
3	3.1e-45	-71.26	−69.83*	-67.64
4	$2.3e-45^*$	−71.59*	-69.69	-66.79

a. The figures in the table report the statistic from each selection-order criteria.
b. * denotes the optimum lag length determined by each model.

4.2 Toda and Yamamoto causality test and impulse response analysis

In this section, we employ Toda and Yamamoto causality and IRA approach to investigate how the oil price shocks affect the China's agricultural commodity prices. Firstly, the long-run Toda and Yamamoto (1995) causality between series are reported in Table 4. We use the standard robust error adjustment to ease the heteroscedasticity as suggested by the tests of Breusch-Godfrey-Pagan, White and Engle's Autorefressive Conditional Heteroscedasticity. To our surprise, the domestic fuel price does not Granger cause prices of rice (rice), flour (flr), soybean oil (syn), peanut oil (pnt), grape seed oil (gsd), salad oil (sld), egg (egg), white granulated sugar (sug), salt (salt), and white chicken meat (wchi) during the covered period. Therefore, the price of fuel price should not be a trusted predictor to the dynamics of agricultural product prices in China. The market of agricultural products in China can be viewed as a separate group from the oil area. The long-run causality also reveals that neither the daily consumption by the public agents in China nor the boifuel production would be threatened by the surging fuel oil price domestically. We can observe the trend of the movement of agricultural product price in figure 2 is much smoother than the dynamics of fuel price in China. The investor of future contract should really deem the investment in oil and agricultural products as alternative area for the risk diversification concern.

However, the IRA in Figure 3 shows that there have short-run temporary effects of fuel oil prices to agricultural product prices. To illustrate, the impulse-response functions with a one-standard deviation shock to domestic fuel oil price has significant impacts on the prices of flour, soy-bean oil, peanut oil, grape seed oil, salad oil, egg, salt and white chicken meat. The initial impact of increasing fuel oil price is significantly positive in the prices of edible oils (i.e. soy-bean oil, grape seed oil, salad oil), but the direction of impact on the other everyday necessities are indeterminate.

Consequently, in contrast to lots of the traditional causality analysis indicates that the oil prices and the agricultural commodity prices do not influence each other, our result is mix: we can infer that the fluctuations of fuel oil prices has a short-run effects on the dynamics of agricultural products; however, insignificant in the long-run effects.

Table4: Todda and Yamamoto: run 10 OLS (with optimal lag order k=3 and adjusted lag order d=1) and export the wald test results (F-test value) here

	ln oil	ln rice	ln flr	ln syn	ln pnt	ln gsd	ln sld	ln egg	ln sug	ln salt	ln wchi
ln oil		4.37***	0.19	0.4	4.26***	2	0.69	1.26	2.06*	0.32	3.03*
ln rice	1.65		0.27	0.67	1.06	0.74	0.87	4.31***	1.30***	0.99	2.23*
ln flr	0.73	2.16*		5.48***	0.64	1.66	4.08***	1.78	1.06	2.18*	1.05
ln syn	1.21	0.91	1.46		1.32	0.58	3.44**	0.49	1.88	1.03	1.47
ln pnt	0.52	1.44	2.29	0.94		1.74	3.12**	0.56	1.13	5.88***	4.28***
ln gsd	0.92	0.39	3.23**	0.91	0.92		9.16***	0.41	1.35	1.24	2.96**
ln sld	0.56	0.59	2.12*	2.34*	5.17***	0.33		2.94**	0.86	1.15	3.09***
ln egg	0.2	3.84***	0.47	0.58	1.98	0.88	3.45**		1.46	1.97	0.1
ln sug	0.45	0.35	1.16	1.55	2.40*	0.42	1.16	1.58		0.43	0.18
ln salt	0.96	0.18	3.83***	0.79	1.65	1.47	2.11*	1.37	0.81		1.93
ln wchi	2.10*	0.88	1.56	0.82	1.23	1.5	2.72**	0.27	3.14**	0.82	
Diagnostic tests											
BG	18.25***	206.16***	174.20***	143.85***	209.32***	227.08***	156.78***	102.83***	193.28***	202.35***	241.96***
BPG	4.39	6.56	19.89***	11.58**	8.38*	18.49***	4.5	18.61***	4.49	6.82	4.19
White	274.88***	400.43***	402.14***	397.28***	380.23***	401.97***	393.28***	376.80***	408.10***	395.82***	407.53***
Arch	24.62***	24.11***	30.73***	19.46***	20.98***	29.18***	35.84***	25.23***	74.12***	52.271***	24.65***
RESET	1.64	2.83***	10.58***	1.62	8.31***	4.29***	0.92	0.17	2.08	2.66**	6.09***

Result:

1. Read tables in rows. *,**, and* denotes significance at the 1,5and 10% level of significance**

2. The result shows that the oil price does not cause any of the agricultural prices to change

3. BG: the Breusch-Godfrey test for the null of homoscedasticity

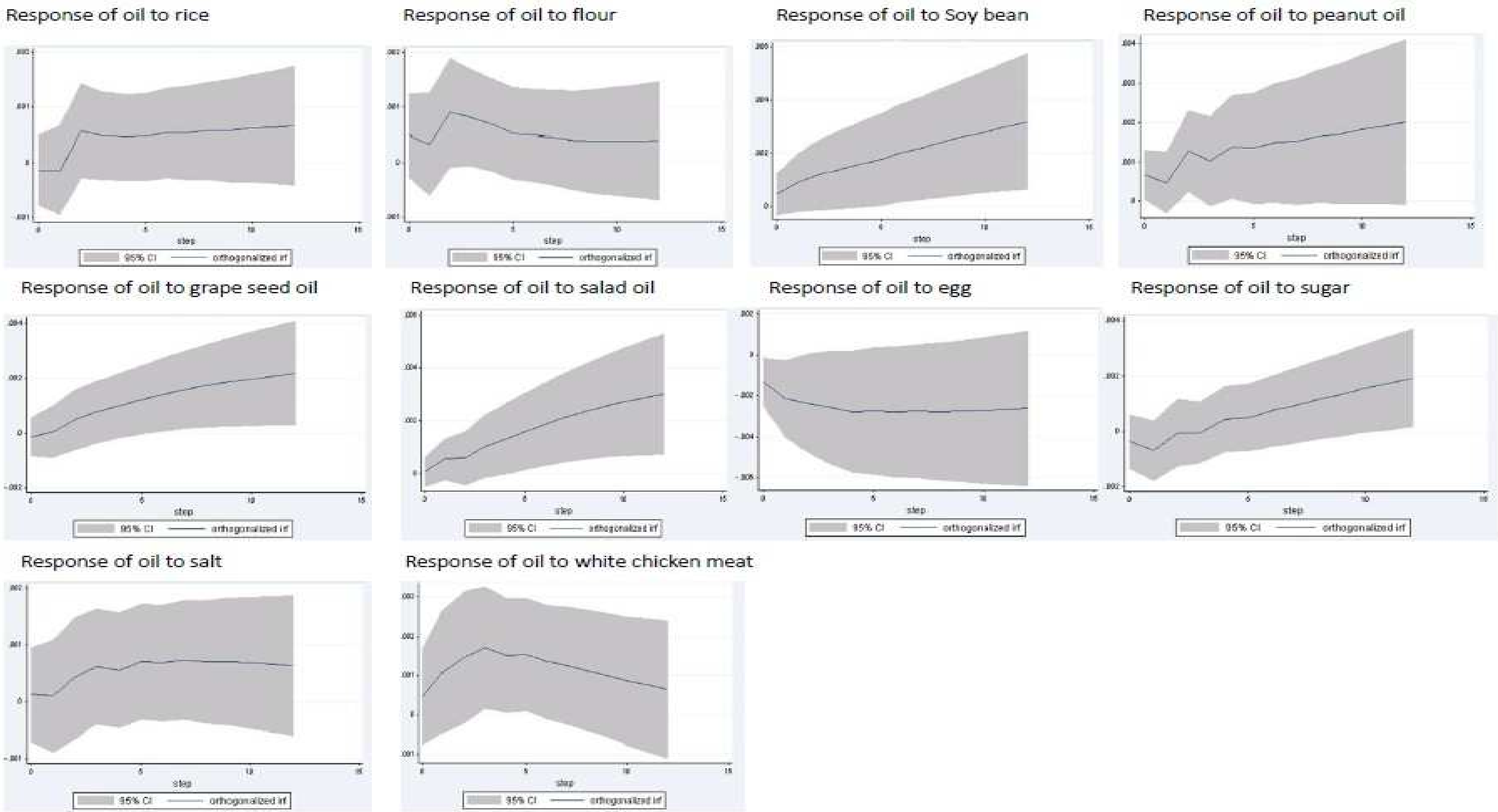
4. BPG: The Breusch-Pagan-Godfrey test for the null of no serial correlation

5. White: the White test for the null of homoscedasticity

6. ARCH: The Engle test for the null of no autoregressive conditional heteroscedasticity

7. RESET: The Ramsey's test statistic with one fitted error term for the null of no functional misspecification.

Figure 3: Response to one-standard deviation shock in the world oil prices



5. Concluding remarks

Although we can see a lot of empirical research has studied the effect between oil price changes and macroeconomic activity, it is surprising that little research has been conducted on the effect between oil price shocks and agricultural commodity markets. Even some studies have examined the impacts of oil shocks on the agricultural product market and economic activity, but only mainly for a few industrialized countries such as the United States, United Kingdom, and Canada. In addition, one major impact in both oil markets and in the international monetary system since the late 1990s is the emergence of China's market. China accounted for one-fourth of the world's incremental oil demand over 1995-2004 and one-third in 2004. Furthermore, China is expected to account from 7% of world oil demand in 2005 to the 12% in 2025, whereas Western Europe is expected to fall back from 19% in 2005 to 15% in 2025. In contrast, until now little empirical work has yet been conducted explicitly so far to disentangle the role of oil price shocks from other underlying determinants driving agricultural commodity prices in China. Consequently, the main purpose of this paper is to study a new and detailed weekly data set from 2004/9 to 2012/9 to fill this gap.

In addition, the empirical evidence on the effect of oil price shocks on agricultural commodity prices has been diversified. Among them, some scholars have found the neutrality assumptions: there is no relationship between agricultural prices and oil prices. On the other hand, the study also found that oil prices - the prices of agricultural products with a one-way causal relationship. This means that the relationship between the prices of oil and agricultural products is still not clear through a literature presentation, we need to deal with this problem through a variety of methods. Therefore, another purpose of this paper is to study the dynamic interactions between oil price and agricultural commodity prices utilizing Toda and Yamamoto causality and IRA approach for mainland China, in order to investigate how the oil price shocks affect the China's agricultural commodity prices more detail.

From this paper empirical study, we find that the impact of oil price shocks on the China agricultural commodity prices has been mixed. First of all, we employ Toda and Yamamoto causality approach to investigate the long-run relationship between oil and agricultural commodity prices in China. To our surprise, the fuel price does not

Granger cause China's selected key agricultural commodity prices during the covered period. Therefore, the market of agricultural products in China can be viewed as a separate from the fuel oil group, the long-run causality also reveals that neither the daily consumption by the public agents in China nor the boifuel production would be threatened by the surging fuel oil price domestically. This finding is similar to Yu et al. (2006), Kaltalioglu and Soytas (2009), Zhang and Reed (2008), Mutuc et al. (2010) and Zhang et al. (2010) etc. empirical conclusion. This result obviously means that the regulation limit and agricultural commodity market control are much more restrictive in China, which makes its agricultural commodity market more separate and independent from the world economy. However, the IRA shows that there have short-run temporary effects of fuel oil prices to agricultural product prices, this means that domestic fuel oil price has significant impacts on the China agricultural commodity prices. This finding is similar to Campiche et al. (2007), Zhang (2010), Hameed and Arshad (2008), Cooke and Roble (2009) etc empirical conclusion. Among them, the initial impact of increasing fuel oil price is significantly positive in the prices of edible oils (i.e. soy-bean oil, grape seed oil, salad oil), but the direction of impact on the other everyday necessities are indeterminate.

Finally, this result is also consistent with Wang and Firth (2004)'s empirical findings that the segmented and integrated China economy is mixed. This implies that China's agricultural commodity market is "partially integrated" with the other agricultural commodity markets and oil price shocks. The investor of future contract should really deem the investment in oil and agricultural products as alternative area for the risk diversification concern.

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